WHAT IS CLAIMED IS:

1. A bi-directional optical add/drop multiplexer which is connected to an optical fiber for transmitting optical signals multiplexed in a wavelength division multiplexing optical network and which performs adding/dropping of the optical signals, the bi-directional optical add/drop multiplexer comprising:

a first wavelength division multiplexer provided with a multiplexing port providing a path for a forward or backward optical signal and with a plurality of demultiplexing ports, each providing a path for demultiplexed channels;

a plurality of add/drop parts, each performing adding or dropping of predetermined channels, and connected with the demultiplexing ports of the first wavelength division multiplexer; and

a second wavelength division multiplexer provided with a plurality of demultiplexing ports, each providing a path for demultiplexed channels and with a multiplexing port providing a path for the forward or backward optical signal, the plurality of demultiplexing ports of the second wavelength division multiplexer connected to the plurality of add/drop parts,

wherein the first wavelength division multiplexer has a free spectral range equal to that of the second wavelength division multiplexer, in which a wavelength band of the forward optical signals is included in the free spectral range having one period, while a wavelength band of the backward optical signals is included in the free spectral range having another period.

2. A bi-directional optical add/drop multiplexer according to claim 1, wherein each of the add/drop parts comprises:

a first coupler connected with a corresponding demultiplexing port of the first wavelength division multiplexer;

a second coupler, connected with a corresponding demultiplexing port of the second wavelength division multiplexer, providing a path of a corresponding forward channel and a path of a corresponding backward channel, together with the first coupler;

a first optical switch, disposed on the path of the corresponding forward channel, for adding or dropping the corresponding forward channel; and

a second optical switch, disposed on the path of the corresponding backward channel, for adding or dropping the corresponding backward channel.

3. A bi-directional optical add/drop multiplexer according to claim 2, wherein:

the first coupler comprises a first wavelength division multiplexing filter having wavelength dependency, the first wavelength division multiplexing filter being provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel, and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a second wavelength division multiplexing filter having wavelength dependency, the second wavelength division multiplexing filter being provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding backward channel traveling, and a third port

for forming the path of the corresponding forward channel.

4. A bi-directional optical add/drop multiplexer according to claim 2, wherein:

the first coupler comprises a first circulator having wavelength independency, the first wavelength division multiplexing filter being provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel, and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a second circulator having wavelength independency, the second circulator being provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding backward channel traveling, and a third port for forming the path of the corresponding forward channel.

5. A bi-directional optical add/drop multiplexer according to claim 2, wherein:

the first coupler comprises a wavelength division multiplexing filter having wavelength dependency, the wavelength division multiplexing filter being provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel , and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a circulator having wavelength independency, the circulator being provided with a first port connected with the corresponding demultiplexing

port, a second port for forming the path of the corresponding backward channel, and a third port for forming the path of the corresponding forward channel.

6. A bi-directional optical add/drop multiplexer according to claim 2, wherein:

the first coupler comprises a circulator having wavelength independency, the circulator being provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel, and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a wavelength division multiplexing filter having wavelength dependency, the wavelength division multiplexing filter being provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding backward channel, and a third port for forming the path of the corresponding forward channel.

7. A bi-directional optical add/drop multiplexer which is connected to an optical fiber for transmitting optical signals multiplexed in a wavelength division multiplexing optical network and which performs adding/dropping of the optical signals, the bi-directional optical add/drop multiplexer comprising:

a first wavelength division multiplexer provided with a multiplexing port providing a path for a forward or backward optical signal and with a plurality of demultiplexing ports, each providing a path of demultiplexed channels;

a plurality of add/drop parts, each performing adding or dropping of predetermined

channels, and connected with the demultiplexing ports of the first wavelength division multiplexer; and

a second wavelength division multiplexer provided with a plurality of demultiplexing ports, each providing a path for demultiplexed channels and with a multiplexing port providing a path for the forward or backward optical signal, the plurality of demultiplexing ports of the second wavelength division multiplexer connected to the plurality of add/drop parts.

8. A bi-directional optical add/drop multiplexer according to claim 7, wherein the first wavelength division multiplexer has a free spectral range equal to that of the second wavelength division multiplexer.

9. A bi-directional optical add/drop multiplexer according to claim 8, wherein the free spectral range includes a wavelength band of the forward optical signals and a wavelength band of the backward optical signals.

10. A bi-directional optical add/drop multiplexer according to claim 7, wherein each of the add/drop parts comprises:

a first coupler connected with a corresponding demultiplexing port of the first wavelength division multiplexer;

a second coupler, connected with a corresponding demultiplexing port of the second wavelength division multiplexer, providing a path of a corresponding forward

channel and a path of a corresponding backward channel, together with the first coupler;

a first optical switch, disposed on the path of the corresponding forward channel, for adding or dropping the corresponding forward channel; and

a second optical switch, disposed on the path of the corresponding backward channel, for adding or dropping the corresponding backward channel.

11. A bi-directional optical add/drop multiplexer according to claim 10, wherein:

the first coupler comprises a first wavelength division multiplexing filter provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel, and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a second wavelength division multiplexing filter provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding backward channel traveling, and a third port for forming the path of the corresponding forward channel.

12. A bi-directional optical add/drop multiplexer according to claim 10, wherein:

the first coupler comprises a first circulator provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel, and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a second circulator provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding backward channel traveling, and a third port for forming the path of the corresponding forward channel.

13. A bi-directional optical add/drop multiplexer according to claim 10, wherein:

the first coupler comprises a wavelength division multiplexing filter provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel, and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a circulator provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding backward channel, and a third port for forming the path of the corresponding forward channel.

14. A bi-directional optical add/drop multiplexer according to claim 10, wherein:

the first coupler comprises a circulator provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding forward channel, and a third port for forming the path of the corresponding backward channel; and

the second coupler comprises a wavelength division multiplexing filter provided with a first port connected with the corresponding demultiplexing port, a second port for forming the path of the corresponding backward channel, and a third port for forming the path of the corresponding forward channel.